Core Content for Mathematics Assessment

What is Core Content for Mathematics Assessment?

Core Content for Mathematics Assessment specifies the mathematics content from Kentucky's Academic Expectations and *Program of Studies* that will be assessed on the state assessment. The content is organized in four content strands:
- Number/Computation,
- Geometry/Measurement,
- Probability/Statistics, and
- Algebraic Ideas.

Academic Expectation 1.5-1.9, **Students use mathematical ideas and procedures to communicate, reason, and solve problems**, operationalizes the processes of how the mathematics is learned and used. Problem Solving, Reasoning and Proof, Communication, Connections, and Representations are the process standards, described in the draft of National Council of Teachers of Mathematics (NCTM) *Standards 2000*, through which students acquire and use their mathematical knowledge. Together, these content and processes provide meaningful experiences that enable all Kentucky students to develop and use mathematical power.

How is Core Content for Mathematics Assessment organized?

The content strands are divided into concepts, skills, and relationships.
- Concepts are mathematical ideas that serve as the basis for understanding mathematics.
- Skills are actions of mathematics.
- Relationships connect mathematical concepts and skills within mathematics and in the real world.

Concepts, skills, and relationships are interrelated in curriculum, instruction, and assessment.

Who is responsible for teaching core content?

The *Core Content for Mathematics Assessment* is not a curriculum. The development of mathematics is a cumulative process that begins with primary and continues through high school. The *Program of Studies* provides a model for aligning local curricula P-12. The core content listed for grade 5 is developed in grades P through 5 and assessed at grade 5; that for grade 8 is developed in grades 6

through 8 and assessed at grade 8; and that for grade 11 is developed in grades 9 through 11 and assessed at grade 11.

What is the focus?

Although there is not an explicit strand for Problem Solving in Kentucky's *Core Content for Assessment*, **problem solving should be the central focus of the mathematics curriculum** (NCTM, 1989). It is the primary goal of all mathematics instruction and an integral part of all mathematical activity. Problem solving is not a distinct topic but a process that should permeate the entire program and provide the context in which concepts, skills, and relationships in the *Core Content for Mathematics Assessment* are learned.

The draft of NCTM *Standards 2000*, which is the revision of the 1989 NCTM Standards, states:

> Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students--
> - build new mathematical knowledge through work with problems;
> - develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics;
> - apply a wide variety of strategies to solve problems and adapt the strategies to new situations;
> - monitor and reflect on their mathematical thinking in solving problems

Who uses Core Content for Mathematics Assessment?

The *Core Content for Mathematics Assessment* is a resource for teachers, administrators, and school councils as they determine mathematics content for **all** students as part of their total mathematics curriculum. It provides guidelines for the Kentucky Department of Education in defining the mathematics content of the state assessment and Kentucky Core Content Test (KCCT). It can also be used as a benchmark for teachers and parents to assess the mathematics progress of students.

What do the codes mean?

The code numbers before each content statement are used to identify, track and collect data on KCCT test questions. The following abbreviations and symbols are used in the codes:
- MA – Mathematics
- E, M, or H – Elementary, Middle, or High School level
- Second Number: 1 – Concepts, 2 – Skills, 3 – Relationships
- Third Number: Number of the Content Statement under Concepts, Skills, or Relationships (each new section begins with #1)

Example: MA-E-3.2.8 means Mathematics, Elementary, Probability/Statistics, Skill #8

Core Content for Mathematics Assessment
Grades Primary through Grade 5 with Assessment at Grade 5

Number/Computation

Concepts - Students will describe properties of, give examples of, and apply to real-world or mathematical situations:

MA-E-1.1.1	Whole numbers (0 to 100,000,000), fractions, mixed numbers, and decimals through thousandths
MA-E-1.1.2	The operations of addition, subtraction, multiplication, and division
MA-E-1.1.3	Odd and even numbers, composite and prime numbers, multiples, and factors
MA-E-1.1.4	Place value, expanded form, number magnitude (order, compare) to 100,000,000, and decimals through thousandths
MA-E-1.1.5	Multiple representations of numbers (e.g., drawings, manipulative, symbols)

Skills - Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to:

MA-E-1.2.1	Read, write, and rename whole numbers
MA-E-1.2.2	Add, subtract, multiply, and divide whole numbers using a variety of methods (e.g., mental, paper and pencil, calculator)
MA-E-1.2.3	Add and subtract fractions with like denominators; add and subtract decimals through hundredths
MA-E-1.2.4	Skip-count forward and backward
MA-E-1.2.5	Estimate quantities of objects
MA-E-1.2.6	Estimate computational results using an appropriate strategy
MA-E-1.2.7	Use factors to determine prime and composite numbers
MA-E-1.2.8	Determine least common multiple (LCM)
MA-E-1.2.9	Order and compare ($>$, $<$, $=$) whole numbers and fractions

Relationships - Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing:

MA-E-1.3.1	How fractions, decimals, and whole numbers relate (equivalence, order)
MA-E-1.3.2	How properties (commutative, associative, identity properties of addition and multiplication, zero property of multiplication) are used in computation
MA-E-1.3.3	How the base 10 number system relates to place value (e.g., ten tens make one hundred, ten hundredths make one-tenth)

Core Content for Mathematics Assessment
Grades Primary through Grade 5 with Assessment at Grade 5

Geometry/Measurement

Concepts - Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations:

MA-E-2.1.1	Basic geometric elements and terms including points, rays, lines (perpendicular, parallel, intersecting), segments, sides, edges, faces, vertices, radius, diameter, and angles (acute, right, obtuse)
MA-E-2.1.2	Basic two-dimensional shapes including circles, triangles (right, equilateral), all quadrilaterals, pentagons, hexagons, and octagons
MA-E-2.1.3	Basic three-dimensional shapes including spheres, cones, cylinders, pyramids, cubes, and triangular and rectangular prisms
MA-E-2.1.4	Symmetry, congruence, and similar figures
MA-E-2.1.5	Nonstandard and standard (U.S. Customary, metric) units of measurement

Skills - Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to:

MA-E-2.2.1	Sort objects and compare attributes
MA-E-2.2.2	Use symmetry to construct a geometric design
MA-E-2.2.3	Identify and draw basic two-dimensional shapes in different orientations using rotations (turns), reflections (flips), and translations (slides)
MA-E-2.2.4	Identify basic three-dimensional shapes by appearance
MA-E-2.2.5	Use nonstandard and standard units to measure weight, length, perimeter, area (figures that can be divided into rectangular shapes), and angles
MA-E-2.2.6	Use standard units to measure volume of rectangular prisms, liquid capacity, money, time, and temperature (e.g., above and below zero)
MA-E-2.2.7	Choose appropriate tools (e.g., protractors, meter sticks, rulers) for specific measurement tasks
MA-E-2.2.8	Identify measurable attributes of an object and make an estimate using appropriate units of measurement
MA-E-2.2.9	Use measurements to describe and compare attributes of objects

Relationships - Students will make connections between concepts and skills, explain how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing:

MA-E-2.3.1	How two-dimensional shapes are alike or different
MA-E-2.3.2	How three-dimensional shapes are alike or different
MA-E-2.3.3	How units within the same measurement system (U.S. Customary or metric) are related
MA-E-2.3.4	How lines of symmetry relate to shapes

Core Content for Mathematics Assessment
Grades Primary through Grade 5 with Assessment at Grade 5

Probability/Statistics

Concepts - Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations:

MA-E-3.1.1	Mean, median, mode, and range of a set of data
MA-E-3.1.2	Probability of an unlikely event (near zero) and likely event (near one)
MA-E-3.1.3	The process of using data to answer questions (e.g., pose a question, plan, collect data, organize and display data, interpret data to

answer question)

Skills - Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to:

MA-E-3.2.1	Pose questions that can be answered by collecting data
MA-E-3.2.2	Collect, organize, and describe data (e.g., drawings, tables, charts)
MA-E-3.2.3	Construct and interpret displays of data (e.g., line graph, bar graph, pictograph, line plot, simple Venn diagram, table)
MA-E-3.2.4	Interpret circle graphs
MA-E-3.2.5	Make predictions and draw conclusions based on data
MA-E-3.2.6	Find mean, median, mode, and range of a set of data
MA-E-3.2.7	Generate all possible outcomes in simple probability activities
MA-E-3.2.8	Determine the fairness of games using simple probability activities

Relationships - Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing:

MA-E-3.3.1	How data are used to draw conclusions
MA-E-3.3.2	How predictions can be based on probability data
MA-E-3.3.3	How the type of display is related to data (appropriateness of graphs)

Core Content for Mathematics Assessment
Grades Primary through Grade 5 with Assessment at Grade 5

Algebraic Thinking

Concepts - Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations:

MA-E-4.1.1   Functions (input-output) through pictures, tables, and words
MA-E-4.1.2   Number sentences with a missing value or variable
MA-E-4.1.3   A positive coordinate system of graphing using ordered pairs

Skills - Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to:

MA-E-4.2.1   Find rules for, extend, and create patterns
MA-E-4.2.2   Create tables to analyze patterns/functions
MA-E-4.2.3   Find solutions to number sentences with a missing value (e.g., $7 + N = 10$, $N + 5 > 14$)
MA-E-4.2.4   Locate whole numbers, fractions, and decimals on a number line
MA-E-4.2.5   Graph ordered pairs on a positive coordinate grid

Relationships - Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing:

MA-E-4.3.1   How patterns (e.g., numbers, pictures, words) are alike and different
MA-E-4.3.2   How rules involving number patterns can be explained

Core Content for Mathematics Assessment
Grades 6 through 8 with Assessment at Grade 8

Number/Computation

Concepts - Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations:

MA-M-1.1.1	Rational numbers (integers, fractions, decimals, percents)
MA-M-1.1.2	Irrational numbers (square roots and π only)
MA-M-1.1.3	Meaning of proportion (equivalent ratios)
MA-M-1.1.4	Place value of whole numbers and decimals
MA-M-1.1.5	Positive whole number exponents
MA-M-1.1.6	Representation of numbers and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences)

Skills - Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations:

MA-M-1.2.1	Add, subtract, multiply, and divide rational numbers (fractions, decimals, percents, integers) to solve problems
MA-M-1.2.2	Compute (e.g., estimate, use pencil and paper, use calculator, round, use mental math) large and small quantities and check for reasonable and appropriate computational results
MA-M-1.2.3	Apply ratios, proportional reasoning, and percents (e.g., constant rate of change, unit pricing)
MA-M-1.2.4	Identify and use number theory concepts[prime numbers, prime factorization, composite numbers, factors, multiples, divisibility, greatest common factor (GCF), least common multiple (LCM) to solve problems.
MA-M-1.2.5	Apply order of operations

Relationships - Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships:

MA-M-1.3.1	How whole numbers, natural numbers, integers, fractions, decimals, percents, and irrational numbers (square roots and π only) relate to each other (e.g., convert between forms of rational numbers, compare, order)
MA-M-1.3.2	How properties such as commutative, associative, distributive, and identities show relationships among operations and may be used to justify steps in solving problems
MA-M-1.3.3	How operations (addition and subtraction; multiplication and division; squaring and taking the square root of a number) are inversely related.

Core Content for Mathematics Assessment
Grades 6 through 8 with Assessment at Grade 8

Geometry/Measurement

Concepts - Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations:

MA-M-2.1.1	Basic geometric elements that include points, segments, rays, lines, angles, and planes
MA-M-2.1.2	Two-dimensional shapes including circles, regular polygons, quadrilaterals (square, rectangle, rhombus, parallelogram, trapezoid), and triangles (acute, obtuse, right, equilateral, scalene, isosceles)
MA-M-2.1.3	Common three-dimensional shapes including spheres, cones, cylinders, prisms (with polygonal bases), and pyramids (with polygonal bases)
MA-M-2.1.4	Congruence, symmetry, and similarity
MA-M-2.1.5	U.S. Customary and metric units of measurement

Skills - Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations:

MA-M-2.2.1	Identify characteristics (e.g., sides, vertices, angles, faces, edges, congruent parts) of two-dimensional and three-dimensional shapes
MA-M-2.2.2	Use appropriate tools and strategies (e.g., combining and subdividing shapes) to find measures of both regular and irregular shapes
MA-M-2.2.3	Move shapes in a coordinate plane: translate (slide), rotate (turn), reflect (flip), and dilate (magnify, reduce)
MA-M-2.2.4	Estimate measurements in standard units
MA-M-2.2.5	Use formulas to find area and perimeter of triangles and quadrilaterals, area and circumference of circles, and surface area and volume of rectangular prisms
MA-M-2.2.6	Estimate and determine measurement of angles
MA-M-2.2.7	Use Pythagorean theorem to find hypotenuse

Relationships - Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships:

MA-M-2.3.1	How measurements and measurement formulas are related or different (perimeter and area; rate, time, and distance; circumference and area of a circle)
MA-M-2.3.2	How two-dimensional and three-dimensional figures are related as seen in different orientations (e.g., top view, side view, three-dimensional shapes drawn on isometric dot paper)

MA-M-2.3.3   How proportional figures are related (scale drawings, similar figures)

Core Content for Mathematics Assessment
Grades 6 through 8 with Assessment at Grade 8

Probability/Statistics

Concepts - Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations:

MA-M-3.1.1	Meaning of central tendency (mean, median, mode)
MA-M-3.1.2	Meaning of dispersion (range, cluster, gaps, outliers)
MA-M-3.1.3	Characteristics and appropriateness of graphs (e.g., bar, line, circle), and plots (e.g., line, stem-and-leaf, box-and-whiskers, scatter)

Skills - Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations:

MA-M-3.2.1	Organize, represent, analyze, and interpret sets of data
MA-M-3.2.2	Construct and interpret displays of data (e.g., table, circle graph, line plot, stem-and-leaf plot, box-and-whiskers plot)
MA-M-3.2.3	Find mean, median, mode, and range; recognize outliers, gaps, and clusters of data
MA-M-3.2.4	Calculate theoretical probabilities and tabulate experimental results from simulations
MA-M-3.2.5	Make predictions and draw conclusions from statistical data and probability experiments
MA-M-3.2.6	Use counting techniques, tree diagrams, area models, and tables to solve probability problems
MA-M-3.2.7	Represent probabilities in multiple ways such as fractions, decimals, percents, and area models

Relationships - Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships:

MA-M-3.3.1	How different representations of data (e.g. tables, graphs, diagrams, plots) are related
MA-M-3.3.2	How theoretical probability and experimental probability are related
MA-M-3.3.3	How data gathering, bias issues, faulty data analysis, and misleading representations affect interpretations and conclusions about data (e.g., changing the scale on a graph, polling only a specific group of people, using limited or extremely small sample size)
MA-M-3.3.4	How probability and statistics are used to make predictions and/or draw conclusions

Core Content for Mathematics Assessment
Grades 6 through 8 with Assessment at Grade 8

Algebraic Ideas

Concepts - Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations:

MA-M-4.1.1	Variables, equations, inequalities, and algebraic expressions
MA-M-4.1.2	Functions (e.g., the relationship between time and cost of some long distance phone calls, $y = 2x + 1$) through tables, graphs, verbal rules, and algebraic notations
MA-M-4.1.3	Rectangular (Cartesian) coordinate system/grid and ordered pairs

Skills - Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations:

MA-M-4.2.1	Simplify numerical and algebraic expressions
MA-M-4.2.2	Solve simple equations and inequalities
MA-M-4.2.3	Model equations and inequalities concretely (e.g., algebra tiles or blocks), pictorially (e.g., graphs, tables), and abstractly (e.g., equations)
MA-M-4.2.4	Use variables to describe numerical patterns
MA-M-4.2.5	Represent and use functions through tables, graphs, verbal rules, and equations
MA-M-4.2.6	Write and solve equations that represent everyday situations

Relationships - Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships:

MA-M-4.3.1	How everyday situations, tables, graphs, patterns, verbal rules, and equations relate to each other
MA-M-4.3.2	How the change in one variable affects the change in another variable (e.g., if rate remains constant, an increase in time results in an increase in distance)

Core Content for Mathematics Assessment
Grades 9 through 11 with Assessment at Grade 11

Number/Computation

Concepts	
MA-H-1.1.1	Students will describe properties of, define, give examples of, and apply real numbers to both real-world and mathematical situations, and understand that irrational numbers cannot be represented by terminating or repeating decimals.
MA-H-1.1.2	Students will recognize, define, give examples of, and apply to both real-world and mathematical situations finite arithmetic and geometric sequences and series.
MA-H-1.1.3	Students will understand how matrices are used to represent real-world data.

Skills	
MA-H-1.2.1	Students will perform addition, subtraction, multiplication, and division with real numbers in problem-solving situations to specified accuracy.
MA-H-1.2.2	Students will simplify real number expressions such as those containing opposites, reciprocals, absolute values, exponents (integer), roots (square, cube), and factorials.
MA-H-1.2.3	Students will use matrix addition, subtraction, multiplication (no larger than 2 by 2), and scalar multiplication to solve real-world problems.
MA-H-1.2.4	Students will determine a specific term of a sequence given an explicit formula and write an explicit rule for the nth term of arithmetic and geometric sequences.
MA-H-1.2.5	Students will use simple combinations and permutations to count discrete quantities.

Relationships	
MA-H-1.3.1	Students will understand how the following subsets of real numbers relate to each other: natural, whole, integers, rational, irrational, reals.
MA-H-1.3.2	Students will understand how real number properties (identity, inverse, commutative, associative, distributive, closure) are used to simplify expressions and solve equations.
MA-H-1.3.3	Students will understand how to use equivalence relations (reflexive, symmetric, transitive) and order relations (less than, greater than, equal to) to solve problems using real numbers.
MA-H-1.3.4	Students will understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems.

Core Content for Mathematics Assessment
Grades 9 through 11 with Assessment at Grade 11

Geometry/Measurement

Concepts	
MA-H-2.1.1	Students will describe properties of and give examples of geometric transformations and apply geometric transformations (translations, rotations, reflections, dilations), with and without a coordinate plane, to both real-world and mathematical situations.
MA-H-2.1.2	Students will define, describe properties of, give examples of, and apply to both real-world and mathematical situations spatial relationships such as betweenness, parallelism, and perpendicularity.
MA-H-2.1.3	Students will define, describe properties of, give examples of, and apply to both real-world and mathematical situations angle relationships such as linear pairs, vertical, complementary, supplementary, corresponding, and alternate interior angles.
MA-H-2.1.4	Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations ratio measures including slope and rate.
MA-H-2.1.5	Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations right triangle trigonometric measures (sine, cosine, tangent).

Skills	
MA-H-2.2.1	Students will perform transformations (reflections, translations, rotations, dilations) on figures.
MA-H-2.2.2	Students will classify two-dimensional and three-dimensional geometric figures according to their characteristics such as lengths of sides; angle measures; and number of sides, faces, edges, and vertices. Students will describe the intersection of a plane with a three-dimensional geometric figure.
MA-H-2.2.3	Students will determine height and distance using methods of indirect measurement such as similar triangles (including shadow or mirror method) and right triangle relationships (including trigonometric ratios).
MA-H-2.2.4	Students will use Pythagorean relationships to solve problems in real-world and mathematical situations.
MA-H-2.2.5	Students will apply the concepts of congruence and similarity to solve real-world and mathematical problems (not including proofs).
MA-H-2.2.6	Students will calculate surface area and volume of rectangular prisms, pyramids, cylinders, cones, and spheres in problem settings using given formulas.
MA-H-2.2.7	Students will apply formulas for the slope of a line, distance between two points, and midpoint of a segment to solve problems.

Relationships	
MA-H-2.3.1	Students will solve real-world geometry problems by using algebra.
MA-H-2.3.2	Students will apply algebra to solve problems involving geometric figures in a coordinate plane.
MA-H-2.3.3	Students will understand how figures in a coordinate plane and their resulting images under a transformation are algebraically and geometrically related. Students will describe elements that change and elements that do not change under these transformations.
MA-H-2.3.4	Students will understand how a change in one or more dimensions of a geometric shape affects perimeter, area, volume, or surface area.

Core Content for Mathematics Assessment
Grades 9 through 11 with Assessment at Grade 11

Probability/Statistics

Concepts	
MA-H-3.1.1	Students will understand how standard deviation measures the scatter of a discrete set of real-world data.
MA-H-3.1.2	Students will recognize that curve fitting (linear, quadratic, exponential) can be used as a method of describing and predicting from a set of data or scatter plot. Students will recognize the appropriate curve for a particular set of data.
MA-H-3.1.3	Students will describe and give examples of various sampling techniques and biases in data collection.
MA-H-3.1.4	Students will understand the differences between combinations and permutations.
MA-H-3.1.5	Students will understand differences between theoretical and experimental probability.

Skills	
MA-H-3.2.1	Students will analyze, interpret results, make decisions, and draw conclusions based on a set of data.
MA-H-3.2.2	Students will plot a set of bivariate data and select an appropriate curve (linear, quadratic, exponential) of best fit.
MA-H-3.2.3	Students will organize, display, and interpret statistical models (tables, graphs) of bivariate data.
MA-H-3.2.4	Students will interpret the results of a probability simulation, draw conclusions, and make predictions.
MA-H-3.2.5	Students will represent probabilities in multiple ways such as fractions, decimals, percentages, and geometric area models.
MA-H-3.2.6	Students will determine probabilities in situations involving replacement and non-replacement.

Relationships	
MA-H-3.3.1	Students will understand how outliers affect measures of central tendency.
MA-H-3.3.2	Students will describe how sampling techniques can influence results.
MA-H-3.3.3	Students will understand and reason about the use and misuse of statistics and statistical representations such as type of graph and choice of scale.
MA-H-3.3.4	Students will use data and curve of best fit to make and defend predictions.

Core Content for Mathematics Assessment
Grades 9 through 11 with Assessment at Grade 11

Algebraic Ideas

Concepts	
MA-H-4.1.1	Students will understand the concept of a function and roles of independent and dependent variables.
MA-H-4.1.2	Students will describe, give examples of, and recognize differences among expressions, equations, and inequalities.
MA-H-4.1.3	Students will understand systems of linear equations (2 equations in 2 variables) and representations of linear systems.
MA-H-4.1.4	Students will identify linear, quadratic, absolute value, and exponential functions from graphs and equations.
MA-H-4.1.5	Students will apply direct and inverse variation to both real-world and mathematical problems.
MA-H-4.1.6	Students will recognize, give examples of, and apply the laws of exponents.

Skills	
MA-H-4.2.1	Students will solve linear equations and linear inequalities.
MA-H-4.2.2	Students will graph the equation of a line.
MA-H-4.2.3	Students will solve systems of linear equations (2 equations in 2 variables) including systems that arise from real-world problems.
MA-H-4.2.4	Students will create tables of numerical values of functions including linear, quadratic, absolute value, exponential, and simple piecewise such as some long distance phone rates.
MA-H-4.2.5	Students will determine the domain and range of a function, the slope and intercepts of a linear function, and the maximum/minimum and intercepts of a quadratic function.
MA-H-4.2.6	Students will determine approximate solutions to quadratic equations.
MA-H-4.2.7	Students will add, subtract, and multiply polynomial expressions, and students will factor polynomial expressions using the greatest common monomial factor.
MA-H-4.2.8	Students will use direct and inverse variation to solve real-world problems.

Relationships	
MA-H-4.3.1	Students will write and solve linear equations describing real-world situations.
MA-H-4.3.2	Students will understand how formulas, tables, graphs, and equations of functions relate to each other.
MA-H-4.3.3	Students will demonstrate how slope shows rate of change in linear functions arising from real-world situations.
MA-H-4.3.4	Students will show how changes in parameters affect graphs of functions [e.g., compare the graphs $y = x^2$, $y = 2x^2$, $y = (x - 4)^2$, and $y = x^2 + 3$].
MA-H-4.3.5	Students will show how equations and graphs are models of the relationship between two real-world quantities (e.g., the relationship between degrees Celsius and degrees Fahrenheit).

Core Content for Mathematics Assessment
Grades 9 through 11 with Assessment at Grade 11